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Inaugural Essay,

on the

Nature and Properties

of the

Blood.

For the Degree of Doctor of Medicine,

in the

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By

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of

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In writing an Inaugural dissertation, it is not to be presumed, that a student, closely confined to the common routine of Study, can adduce any thing very new or striking:- The judicious selection, and harmonious arrangement of facts, is all that can be reasonably expected from his inexperienced Pen.

Should the following Essay, evince a want of novelty or interest, the cause will not I trust be imputed to want of Industry,

but, rather to the nature of the subject.— —In making the Blood the subject of the present Essay— I have been influenced more by the novelty of the subject, than by any idea of my own competency to do it justice:— So well and ably has it been treated of, by the ever memorable, and justly Celebrated Hunter, that, it might appear to some, presumptuous in me, to enter upon a field so much exhausted;— But, I rest satisfied, well assured, that the indulgence of the Faculty will be granted.—

Few of the Laws of the animal Economy, are more intricate, than those that relate to the blood;— It is, indeed, easy

to state the appearances which it usually presents.- But, with the origin of the changes which it undergoes,- and the causes of its different phenomena, we are but little informed. And the erroneous speculations, and unfounded theories, which have been adduced for the purpose of removing the veil of nature, have tended only to retard the progress of inquiry, and to add, "Darkness to obscurity".-

There is another point however, which should re-ceive some attention:- It is this,- viz: that, although ~~should~~ the blood should receive due attention from all,- yet,- neither, the Anatomist,- The Physiologist- The Chemist-

or, The Practitioner, claim it, as coming under their own immediate province; It has consequently been very much neglected; - The Chemist, it is true, has paid considerable attention to its proximate and constituent principles: - The Physiologist, to its vital Phenomena: - And the Practitioner, to its Morbid appearances, &c, But, it may, I think, with some degree of truth, be said, that each one, has attended more particularly to his own view of the subject, to the Detriment of all others. That It might be my happy lot, to improve these things, is my sincere desire, - but, more cannot be expected, - from a pen so inexperienced as mine, - than a feeble attempt to arrange and harmonize the facts which have been so abundantly advanced by a great number of con-

-tributors. ——

The Blood.

The Blood is a peculiar fluid, circulating throughout the vessels of all classes of animated beings; it penetrates into almost every recess of the Body, distributing itself through the nume-rous capillaries of its different vessels, af-fording Nutriment and vitality.—

The importance of this fluid, is very considerable; it distends the cavities of the heart, and bloodvessels, and prevents them from collapsing; it also stimulates them to contraction, by which means, the circulation is performed. it is supposed to generate within itself animal-Heat, which it propagates throughout the Body:

it nourishes the whole Body, and also, is that source, from which, every secre-tion of the Body is derived.-

Blood, when first drawn from the vessels is an adhesive fluid of a homogeneous consistence, and in the Human subject, of the temperature of about 97° Farh.t - very soon after being drawn, if suffered to remain at rest, it coagulates, and during that process, separates into two distinct parts, so that at last, it appears, a red mass, floating in a yellowish fluid; this red mass, is called the Crassamentum, and the yellow fluid - the Serum. The Crassamentum usually floats in the Serum, but, instances have been recorded by De Haen, - Hunter - and by Hey, of the Crassamentum enveloping the Serum. There is also, another part, which will not coag-

late, except by Extract of Lead, and which is denominated "Serosity".

The Halitus.

After Blood has been fresh drawn, and previous to its cooling, there is a steam or vapour continually flying off, which is found to consist of Carbon and Hydrogen. Thackrah, says it differs very little from common water. Plenck, seems to have paid most attention to it; he calls it, "gas animale sanguinis", and says that it produces many very important effects in the animal economy. It has a putrid smell, between urine and sweat.

Of the Coagulation of the Blood.

The first change which the blood undergoes after being drawn from the vessels, is its Coagulation, the period for the completion of which pro-

cess, is averaged at about 5 minutes. Thack-
-rah, says it is fully completed, in from
3 to 8 minutes after being drawn, tho'
in some instances it is a much shorter
period, in coagulating. The first stage,
towards coagulation, is a species of decom-
-position, which causes a separation of
the Serum: The Serum, constituting a
part of the whole mass, in the fluid
state: But, it is not exactly known, whether
the Serum, while the blood is circula-
ting, be a distinct part of the blood, as
we have no means of separating it,
from the Crassamentum: The cause of
the coagulation of the blood, has never
been thoro'ly explained, it is a circum-
-stance which does not exactly resem-
ble any other with which we are ac-
quainted, and the operation of external
agents upon it, is not so well marked,

as to enable us, to refer it, to any general operation of the Physical properties of matter. It was supposed that Coagulation depended upon the action of the air, but this is not correct, for it will coagulate "in vacuō". It was also thought to depend upon the abstraction of heat, but Heat has been found to hasten the Coagulation. After the Crassamentum has been exposed to the air, for some hours, its exterior imbibes oxygen, and assumes a florid Hue; this change resembling that produced in the Lungs by respiration. It has also been observed, that if the Crassamentum, be not kept moist, in the Serum, instead of becoming scarlet, the Colour becomes a dark brown. In many kinds of death we find, the blood does not coagulate: In some cases, the muscles will con-

tract, and the blood will remain fluid. in some cases, the contrary will take place: while in others, the blood will coagulate only to the consistence of cream. Blows on the stomach, kill immediately, and the muscles do not contract, neither does the Blood coagulate: Death, caused by sudden fits of passion is of this nature, - and in most of these cases the body very soon after death, becomes putrid.

In many diseases, if accurately attended to, there is no doubt, but that we should find this correspondence, between the muscles, and the blood; for, (as Mr Hunter observes) where there is strong action going on, the muscles contract strongly after death, and the blood also coagulates strongly. The quantity of blood, contained in the

body, has never yet been exactly ascertained; Sir Astley Cooper, supposes it to be about $\frac{1}{14}$ of the weight of the body: Having procured a dog, weighing 14lbs he opened the Internal Jugular vein, from whence he obtained ℥14 of blood, he afterwards opened the common Carotid artery and obtained ℥ijß more; the dog then died, and Sir Astley supposed that there remained in the Heart, about ℥ij more of coagulated blood.-

— Of the Crassamentum. —

The Crassamentum, may be separated by ablution into 2 parts; The Fibrine, and the red Particles or Cruor.

— Of The Fibrine.- If fresh drawn blood, be stirred with a stick, for a few minutes, an adhesion of a substance, to the rough surface of the stick takes place, and this flaky substance, by

repeated washing, distinctly shews the Fibrine which forms its basis. It consists of Azote Carbon and Hydrogen; the former of which, prevails most; It appears also from Hatchett, that there exist some traces of albumen. Fibrine is with difficulty soluble either in Sulphuric Acid, Alcohol or in solutions of Ammonia, and is scarcely at all affected, by any other chemical agent.

Of The Red Particles or Cruor.

They have been supposed to be circular: Mr Hewson, describes them as consisting, of a solid centre, surrounded by a vesicle filled with a fluid; he also says, that by adding water to them, they swell out, and become larger; he afterwards says, they are soluble in, and impart their colour to water.

When they are put into water, they dissolve, which destroys their globular form; it is therefore the Serum, and probably the coagulating Lymph also, while circulating, which confines them to this globular form; but if we dilute the Serum with water, they dissolve in it; and this appears to take place in a moment; also, if urine be diluted with water, they dissolve in it. They are also soluble in vinegar; but if the vinegar be diluted with water, they will dissolve sooner in it, than in either vinegar or water alone. Lemon-juice dissolves them. They are said to be of the same size in the mouse as in the ox, - larger in birds - and still larger in the Skate-Fish. Baker,* speaking of the water-sow, states that the "globules appear about ten times as large" "as those of the Human blood, and

*Employment for the Microscope.

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"their progressive motion is very slow, and lan-
-"guid, whereby, they become more distin-
-"guishable than the globules are, in the
"blood of animals whose circulation is
"swifter". – Nitre, considerably augments
their colour so as to convert it, to a bright
red; while on the contrary there are some
substances, by which, their colour is des-
-troyed, without altering their form.
If we dilute Muriatic Acid, so as to be
more pungent and three times stronger
than common vinegar, it does not dis-
-solve them, but merely destroys their
colour; but, by adding more water
to them, they are dissolved. The Neutral
salts, will also destroy their colour.
They do not circulate all over the
body: (for example, they do not circu-
-late in the conjunctiva.)

Of The Serum.

The specific gravity of the Serum, has usually been stated at 1020 to 1030.- Bostock considers it to be 1023:- And Marcet 1029. The Serum, is that fluid part of the blood of a yellowish Colour, rather inclining to green; It is heavier than water, and has the property of turning blue vegetable colours green. Coagulation is not necessary to separate the Serum, from the blood, for we find it separated in disease, as in Dropsy. In Dropsy the Serum constitutes about 3/4 of the whole mass of the Blood. It varies in quantity, in different persons; in the robust, it is small in proportion as 1/3; in thin and emaciated people, it is much larger.- The Sulphuric and other mineral acids readily coagulate Serum; and its albumen is precipitated in the form of a

flaky mass. It will coagulate on exposure to heat of 150° or 160° Farenheit. -
The use of the Serum, is probably, to keep suspended and undissolved the red globules, for it is found in larger quantity where these red globules are most abundant. It is perhaps also intended, to suspend and keep dissolved, any foreign substances in the blood, whether of use to the body or otherwise, by acting on them as a solvent. Thus, we see, in a person afflicted with Jaundice, The Serum is yellower than common, also when a person has taken Rhubarb, we may perceive the same effect. Mr. Hunter, supposes it to be the solvent of all our secretions.

Of the Serosity.

The existence of the "Serosity," as a substance distinct from the albu-

-men, seems first, to have been noticed by Butt, in a Thesis published at Edinburgh, in 1760. Its properties were still further developed by Cullen, in his "Institutions," & it became the subject of more mi-
-nute chemical analysis in France, by Par-
-mentier and Deyeux: The most im-
-portant point, which the French chem-
-ists stated as the results of their experi-
-ments, is the discovery of a quantity of Gelatine, contained in the Serosity, uni-
-ted with a variety of other salts, from which no mode, is at present known, of separating it, without its being de-
-composed. Dr. Marcett, gives it the name of "Muco-extractive matter."

Of The Chemical Qualities, Of The Blood.

Berzelius states, that the blood of the ox, differs in no respect, from

that of the human subject, except, in containing more azote, and a less proportion of the Saline matter. The latter, however is a circumstance curious and unexpected, when we consider, that man, lives in a great measure, on animal food; while the ox sustains life, wholly ~~on~~ by vegetable aliment.

The blood, of some creatures, is found, while circulating, to contain air bubbles; they are found, in the land, and sea-tortoise, - in the Hedge-Hog, - in fish - and in the viper.

In a former part of this essay, it was mentioned, that the blood was of the temperature of 97° Fark.t;- its temperature has been known to be materially altered. In Febrile cases, the heat of the blood, as well as of the body, is sometimes, augmented several

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degrees, while, on the contrary, in some affec
tions, the blood, as it flowed from the
veins has produced, a marked sen
-sation of cold; Morgagni has re-
-lated several instances, in one of which,
the Patient, compared the feeling produ-
ced by the stream on her arm, to that
of Ice. In most of these Cases, there
existed some nervous affection;-
Thackrah also relates an instance
of a woman; (Pregnant;) he says, that
on Bleeding her, the Stream produced
a chilly feel, both on his finger and
on the Patients arm; he says the case
was not attended with any remarka-
-ble symptoms,- the Patient suffering
only from the ailments common
to her condition.